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### ***published in***

Policy and Practice in Health and Safety  
2012

### ***document version***

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### ***citation for published version (APA)***

Koning, P. W. C. (2012). Anticipated and Unanticipated Incentives of Disability Insurance Experience Rating: The Case of The Netherlands. *Policy and Practice in Health and Safety*, 10(2), 63-76.

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# Anticipated and unanticipated incentives of disability insurance experience rating: the case of the Netherlands

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## Abstract

**Objectives:** This paper examines and discusses the effects of experience rating on the flow into disability insurance in the Netherlands. A special focus is given to the distinction between (and importance of) anticipated and unanticipated effects of experience rating.

**Methods:** We use longitudinal administrative firm data from the Dutch social benefit administration. The data set covers employers from 2000 to 2002. To estimate the anticipated effects of experience rating, We take advantage of the fact that the premium-setting system was incomplete – that is, there is no (further) incentive to reduce disability insurance costs if a maximum premium is reached. Unanticipated effects are uncovered by comparing employers that are hit by premium increases (ie the ‘treatment’ group) with those who are not (ie the control group), while controlling for employer fixed effects.

**Results:** There is only weak evidence for the effects of anticipated incentives. This contrasts with substantial findings on the unanticipated impact of experience rating.

**Conclusions:** It appears that the decision of employers to increase preventive activities is mainly an issue of being aware of the experience-rating incentive. When taking a broader perspective, however, evidence suggests that the enhanced incentives have also led to an increased flow into unemployment insurance and other benefit schemes.

## Key words

Experience rating, disability insurance, panel data

## Introduction

At present, the Netherlands stands out as a country with relatively high disability insurance (DI) experience-rating incentives. On average, about 40 per cent of DI costs was experience-rated in 2010.<sup>1</sup> For this scheme, employers bear the costs of wage continuation during sickness for two years, together with the first 10 years of the DI benefit.

When the DI experience-rating plan started in 1998, with a time window of five years of DI benefit expenditures, it did not cause substantial controversy among employers and policy-makers. Criticism about the scheme arose, however, when there was a rapid increase in the number of employers who were confronted with substantial increases in their premiums. Each year, a new cohort of disability benefit costs was added to the disability premium, causing the rate of experience-rated DI costs to rise until 2003. The incentives became stronger in 2006, when a major DI reform took place, with the time window of DI experience-rating being extended from five to 10 years of DI benefit for workers with partial and temporary disabilities. At the same time, however, the newly introduced DI scheme for the much smaller group of workers who were permanently fully disabled was not experience-rated at all.

Experience-rating follows from the principle that employers may be given discretion as to their prevention and reintegration activities, provided that the corresponding costs are not imposed on other agents. Without the incentives of experience rating, one may expect the DI scheme to be over-used. When looking at the literature on workers' compensation, however, there is only moderate evidence that experience rating reduces the incidence of work injuries.<sup>2,3,4</sup> In particular, firms may engage in claims management practices and concentrate on preventing less severe injuries only. In addition, there is no compelling evidence on the effects of different degrees of experience rating.<sup>2</sup>

With most of the studies in the literature focusing on workers' compensation in the USA and Canada, it is interesting to investigate the effects of experience-rating incentives in the Netherlands. In light of the broad and generous set-up of the DI scheme, the case for experience rating to combat moral hazard problems may be stronger for the Netherlands. In particular, there is strong evidence that the DI scheme had been used in the past by employers as an exit route for redundant workers.<sup>5,6</sup> For workers, benefit levels for both the sickness scheme (ie full wage payments) and the disability insurance scheme (70 per cent of last earned wage) remained generous until 2004. In 1996, the sick pay scheme was privatised in the sense that employers were mandated to cover sickness benefits for 12 months at most. This self-insurance period was extended to 24 months in 2004. Moreover, DI experience rating at the level of the individual firm was introduced in 1998. As a consequence, employer incentives to reduce benefit costs were substantial. Because of the generosity of the schemes, there was a large potential to reduce the use of the schemes, both by sickness prevention and reintegration from sickness prior to the DI claim assessment.

This paper examines the effects of experience rating on the flow into disability insurance in the Netherlands, using a unique longitudinal administrative data set from the Dutch social benefit administration. The data set covers employers for the years 2000, 2001 and 2002. The data for these years cover about 370,000 firms, employing roughly 6 million insured workers (about 75 per cent of the working population in the Netherlands). For each firm, we observe firm-specific characteristics, some variables on the worker composition, as well as information on disability cohorts, the disability risk and the experience-rated premium.

In our analysis, we focus specifically on the distinction between the anticipated and unanticipated effects of experience rating. Anticipated incentives arise when employers are aware of the experience-rating incentive system and try to prevent future flow into the scheme by promoting the health and safety of their workers, and preventing the loss of their employability. Within the context of our analysis, the identification of anticipated effects of experience rating follows from the comparison between firms with 'complete' incentives and those with 'incomplete' incentives. In particular, the marginal incentive to limit the flow into disability insurance is zero (or incomplete) if a maximum premium is reached. Anticipated incentives are effective when employers are fully aware of the experience-rating scheme; they know that, at the margin, their preventive efforts are likely to result in lower premium rates.

When addressing the unanticipated effects of experience rating, we review the findings of earlier research with the same data.<sup>7</sup> In essence, unanticipated experience-rating effects result from a lack of awareness on the part of employers. Unanticipated premium increases may trigger employers to increase preventive activities. In particular, from the perspective of smaller firms, the experience-rating system is complex and seemingly unimportant – as long as there is no flow into disability insurance. This corresponds with earlier analyses on workers' compensation which stresses that there is little awareness of experience rating

among individual firms.<sup>3</sup> It is argued that administrative time delays, as well as the complexity of the premium calculation system, reduce the (potential) incentive impact of experience rating.<sup>8</sup> These findings may also have been relevant for the first years of the experience-rating system in the Netherlands.

This paper proceeds by describing the Dutch DI system, with particular attention on the experience-rating premium system that was effective from 1998 to 2002 – the time period under consideration in the empirical analysis – and still is effective for the partial and temporarily fully DI scheme today (but with a longer time window). Following a brief discussion of relevant data, we present our empirical strategies to detect the anticipated and unanticipated effects of experience-rating, as well as the respective estimation results. We conclude with a discussion of these results.

### Disability insurance in the Netherlands

In the Netherlands, the provision of DI is mandatory and financed by pay-as-you-go contribution rates. In principle, the programme covers all workers against all incomes losses that result from both occupational and non-occupational injuries. As a result, the system is different from US workers' compensation schemes that cover occupational injuries only.<sup>9,10</sup> Combined with the public monopoly provision of DI, this makes the disability determination system rather susceptible to moral hazard problems – that is, for both employers and workers, the scheme may be an attractive alternative pathway into unemployment.<sup>5,6</sup> Moral hazard problems are aggravated by the generosity of the DI system, which is based on the individual earnings capacity. This means that disability is measured as a percentage of one's earning capacity, rather than an all-or-nothing condition. The residual capacity is defined by the earnings flowing from any job commensurate with one's residual capacity as a percentage of pre-disability (covered) earnings.\* Earnings are measured without taking into account the former occupation or skills of the worker, or their employment conditions at the time of the assessment. The degree of disability is the complement of the residual earning capacity. Such a definition allows for a continuous scale on which to measure earnings loss, and a corresponding scale of compensation.

Over the years, the Dutch DI programme has repeatedly been subject of public debate. This is not surprising, as the DI enrolment and DI use in the Netherlands has remained high and persistent (see Figure 1). Expressed as a percentage of the insured population, DI beneficiary volume peaked at 16 per cent in the mid-1980s, then declined and stabilised at about 13 per cent until 2001. After 2001, we observe a dramatic decline in the DI inflow and DI stock. Note that about one-third of the drop in yearly DI inflow – from about 100,000 workers in 2001 to about 40,000 workers in 2010 – was due to an extension of the sickness benefit period from one to two years in 2004. The decline in DI inflow was caused by a reduction in sickness rates, which in turn was caused by increased return-to-work rates of workers.<sup>11,12</sup> From the mid-1990s, various reform plans were introduced to increase employer incentives. As mentioned earlier, the sickness benefit programme was privatised in 1996, making employers fully responsible for these costs. In 1998, employers' incentives were enhanced by the system of DI experience rating. Moreover, in 2002, the (potential) impact of incentives was further extended by a more stringent system of gate-keeping (there were very few

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\* The Dutch statutory minimum wage impacts on the DI benefits of workers with low wages. Such workers either get a low benefit percentage if their earnings are still higher than or equal to the minimum wage, or a full DI benefit if their earnings capacity is lower than the minimum wage.

**Figure 1**  
Stock and flow  
of workers into  
disability  
insurance  
(1968–2010)



employer obligations prior to 2002), and an extension of the sickness benefit period. In order to be eligible for a medical DI assessment, both workers and employers have to meet several conditions, so as to convince the benefit administration that disability was unavoidable. The most recent change in the Dutch DI system entailed the start of two different types of benefit in 2006: the IVA (Inkomensvoorziening Volledig Arbeidsongeschikten) benefit for full and permanent disability, and the WGA (Werkhervatting Gedeeltelijk Arbeidsgeschikten) benefit for partial or temporary full disability. A claimant is awarded an IVA benefit if the capacity loss expressed in earnings is 80 per cent or more and when there is no potential for any degree of recovery. An IVA benefit is 75 per cent of previous gross earnings. A worker is awarded a WGA benefit if their loss of capacity is between 35 per cent and 80 per cent, or more than 80 per cent but with the prospect of recovery. Thus, the WGA benefit applies to workers who are partially disabled as well as those who are temporarily fully disabled. For workers with a capacity loss of less than 35 per cent, there is no (public) DI scheme – employers bear the costs of production losses that come with this, but in practice these workers also may have a higher risk of being laid off.

As we explained earlier, in 2006 the experience-rating incentive was increased for the WGA benefit, while it ended for the IVA benefit. In effect, it seems that the overall incentive of experience rating has not changed substantially as a result of these modifications. Simulation studies suggest that only about one-third of decreases in DI enrolment since 2006 was due to the introduction of the WIA, while the rest can be attributed to effects of the extension of the sickness benefit period, the new gate-keeping system, and the experience-rating system that started in 1998.<sup>12</sup> All these measures affected the flow into the DI system, causing the total stock of DI benefit recipients to fall as well. As to the experience-rating incentives, the outcomes suggest that most gains in the flow into disability insurance were made in the sickness benefit period. Thus, employers were induced to prevent workers from exhausting their sickness benefits, thereby avoiding DI claims to come.

### Experience rating and data set-up

The calculation of the experience-rated DI premium of employers in the Netherlands entails the determination of the disability costs percentage and – subsequently – the disability premium.<sup>13</sup> In the time period under investigation, the employer disability cost percentage ( $d_t$ ) at time  $t$  equalled the benefit costs of the five most recent DI worker cohorts that worked for the employer; premiums that are set for the other cohorts are set equal to sectoral averages. These costs were divided by the average wage sum of the employer over a five-year time window.\* Both the nominator and the denominator are registered with a delay of two years:

$$\sum_{s=0}^T \hat{r}^2 = 3^2 \quad (1)$$

where  $S_{a,b}$  are the disability costs of an employer in year  $a$  for recipients who entered into the programme at time  $b$  (with  $a \geq b$ ), and  $W_a$  the insured wage sum at time  $a$ .  $T = 4$ , as we have

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\* New firms have a time window that is obviously too short to calculate the DI premium in a standard way. Therefore, equation (1) has to be rescaled to  $T = 0$ . For each additional year,  $T$  increases by 1, up to a maximum of  $T = 4$ .

a five-year time window. Averaging the wage sums over a time window of five years diminishes the effect of the volatility in wage sums. This way of smoothing also results in some cross-subsidisation of the experience-rating system: when multiplying the disability cost percentage with the current wage sum, employers with high wage sum growth rates will pay more than their disability costs, and downsizing firms less than that. In some cases, the information that is needed to calculate the disability risk may be incomplete, eg if employers have started their businesses recently, or when for some period there are no workers at a particular firm. This means that the disability risk has to be calculated over fewer than five years, and subsequently rescaled to a five-year period.

The calculation of the employer DI premiums is based on the employer disability cost percentage, using the following algorithm:

$$p_t = \min(p_{min} + d_t, p_{max}) \quad (2)$$

where  $p_t$  is the premium rate over the wage sum, and  $p_{min}$  and  $p_{max}$  the minimum and maximum premiums – indicating the range over which  $p_t$  may vary. Equation (2) shows that the experience-rating system is ‘incomplete’: higher disability costs result in proportionate increases in the DI premium up to  $p_{max}$ , but over-users do not pay the additional costs they impose on their system.\* This contrasts with the US system, where there risks below a certain threshold do not translate into higher premiums. The minimum premium is a uniform premium that is paid by all employers (also for  $d_t = 0$ ). The values for both  $p_{min}$  and  $p_{max}$  vary with respect to firm size, the argument being that small firms are more susceptible to (exogenous) variation in their DI cost percentage. In particular, small firms are defined as those with a wage sum that is smaller than the average wage sum per worker in the Netherlands, multiplied by 15 (workers).† Using an iterative algorithm, minimum premiums are set at the level that balances the total disability costs with the collected premiums.‡ Small firms are more likely to pay the maximum premium, as the actual spread of disability risks is higher for this group. Consequently, higher minimum premiums are needed for this group to finance firms that are paying the maximum premium.

Employers receive a separate specification when they have individual disability costs, causing the premium to exceed the minimum. In practice, the variation in premium rate increases that is due to individual disability costs is far more substantial than the variation in the minimum premium.‡ Moreover, it is far more likely that the separate notification will catch the attention of employers, rather than the standard social benefit specification that, next to unemployment

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\* Experience-rating systems may also be incomplete at the lower boundary of the disability cost distribution, instead of the upper boundary only. The experience-rating incentive then becomes effective from the point that disability costs exceed a certain minimum.

† In particular, if the wage sum of an employer exceeds 15 times the average wage sum across all employers, then  $p_{min}$  is set lower, and  $p_{max}$  higher, thus extending the support of premiums. For these employers, the maximum premium is set equal at four times the average premium, whereas for small firms it is three times the average premium. Note that there is no (further) variation in minimum and maximum premium rates between sectors.

‡ Note that minimum premiums are needed to finance the DI costs over employers paying the maximum premium. Moreover, minimum premium revenues are needed to finance the disability costs of firms that have gone bankrupt, or to make up past reserve deficits.

insurance information, (only) includes information on the minimum premium. It also should be noted that there was no public campaign to inform employers on the experience-rating plan. This renders it likely that awareness of the system was low in the first years.

Nearly all the administrative information that is needed for the calculation of disability cost percentages and DI premium rates contains worker information (such as age and gender) that can be aggregated to the level of employers.\* Data are also derived from the social security records, containing information on the DI benefit recipients for various cohorts. This also includes the flow into the DI programme. We have merged these three administration systems using employer codes, resulting in a panel data set of about 370,000 employers, employing roughly 6 million workers. We select employers with at least 10 employees. This reduces our sample size substantially – about 80 per cent of the employer population is left out – but, in terms of the number of workers, the loss is only about 20 per cent. Also, note that the data set does not cover all employers and workers in the Netherlands. Experience-rated premium rates cannot be calculated for firms that have existed for less than one year, or firms that have merged or split up recently. This induces some variation in the number of employers that is observed in the data over time, as well as the number of employees.

### Anticipated incentive effects

In the literature, the identification of incentive effects of experience rating is essentially built on two assumptions: exogeneity in (marginal) incentive variation; and local linearity of the incentive system. First, it is assumed that variation in the marginal experience incentive is – at least to some extent – exogenous. Exogeneity may arise in the case of (inter-state) variation in the experience-rating systems – such as the unemployment insurance (UI) programmes in the USA, where the degree of completeness of experience rating varies between states. For the Netherlands, such an approach is not applicable, as the only institutional variation comes from the distinction between small employers and medium and large employers. Exogeneity may also stem from variation in the experience-rating incentive over time for individual firms, using longitudinal employer data. Identification then follows from movements of employers along tax or premium schedules.<sup>14</sup>

Second, the local linearity assumption is needed to ensure that employer decisions are driven by the current marginal incentive. That is, the incentive the employer is faced with is well approximated by the slope that determines how the employer's costs would change in case of a small one-time increase in DI costs. This requires both the support of the risk distribution with and the support without the marginal incentive to be sufficiently long. In particular, it should not be likely that the disability risks of employers move to another part of the support the following year, causing the marginal incentive to change.

As for the Dutch DI system of experience rating, one way to assess the effects of anticipated incentives entails a comparison of employers with equal disability risks but different marginal incentives. For some part of the support of the disability risks, the marginal incentive is limited to medium and large employers only, with small employers paying the maximum premium. This range of disability risks is defined as:

$$p_{max} - p_{min} < d_{it} < p_{max} - p_{min} \quad (3)$$

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\* For an extensive description and presentation of the merged data, we refer to the earlier research with these data.<sup>7</sup>



with  $p_{min}$  and  $p_{max}$  denoting the minimum and maximum premiums for employers.\* When assuming the local linearity assumption to hold for (almost all of) the support that is defined in equation (3), we can estimate the anticipated effect of experience rating by comparing small and medium-sized/large firms, while controlling for the individual disability risk. We then estimate the ‘average treatment on the treated’ (ATT), that is, the effect of the experience-rating incentive on medium and large-sized employers for the distribution support described by equation (3). Using log-odds specification for the fraction of DI inflow  $f$  for employer  $i$  at time  $t$ , the regression is then as follows:

$$\ln \{ f_{it} / 1 - f_{it} \} = X_{it} \beta + \Phi(d_{it}) + \eta I(p_{max} - p_{min} < d_{it} < p_{max} - p_{min}) + \varepsilon_{it} \quad (4)$$

where  $X$  is a matrix that denotes (time variant) employer-specific characteristics and  $I$  is an indicator function denoting the event between parentheses – that is, the disability risk satisfying the condition that is defined in equation (3).  $\beta$  is a vector of parameters describing the effect of  $X$ , whereas  $\eta$  denotes the effect of the (anticipated) incentive of experience rating.  $\Phi$  denotes a (polynomial) spline function of the disability, so as to control for the disability risk. Finally,  $\varepsilon$  is a residual term that is assumed to be independently and identically distributed.

Table 1 reports the coefficient estimates that follow from the Grouped Logit<sup>†</sup> estimation of equation (4) on yearly cross-sections of the employer data. Here, it should be noted that pooling all cross-sections was not possible, as the time window of the disability rate controls was still increasing up to its maximum of five years during the time period under investigation. This would render a comparison between disability rates over time impossible.<sup>‡</sup> For expositional reasons, the coefficient estimates of the spline function (with eight polynomial terms for all three years) are not reported in the table. To start with, it should be noted that there is substantial variation in the DI inflow rates between sectors, and (employed averaged) age and gender of workers. This variation is less marked for (employed averaged) wages and employer size.

As to the incentive effect, we only find a significant and negative impact coefficient for 2002. For this year, the incentive impact equals about 20 per cent of the DI inflow rate. It may well be that the relevant interval of disability risks in the indicator function  $I$  is too limited to obtain sufficient employer observations in 2000 and 2001. For instance, in 2000 there were only 175 employers of small firms that constitute the control group on the relevant support. This is also reflected in the relatively large size of the standard error of the incentive coefficient in that year. In 2002, however, it seems the support lasted long enough to obtain more efficient – and significant – estimates of the experience-rating effect. Moreover, the longer support of relevant disability risks also lends more credence for the local linearity assumption to hold. However,

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\* From 2000 to 2002, the support increased from 1.96 to 2.80 per cent. For example, in 2002  $p_{min}$  and  $p_{max}$  were equal to 1.24 per cent and 6.06 per cent, and  $p_{min}$  and  $p_{max}$  were set at 0.45 per cent and 8.08 per cent. Thus, the premium range with different marginal incentives for employers with small employer size and those with medium and large employer size was 4.82% (6.06–1.24) < .. < 7.63% (8.08–0.45).

<sup>†</sup> We use Grouped Logit Maximum Likelihood estimation to take account of the discrete nature of the data. In particular, for any employers have just a handful of employees, causing the likelihood of having no inflow to be substantial as well. Therefore, estimating equation (4) by standard linear estimation techniques would yield inconsistent estimation outcomes.

<sup>‡</sup> A similar argument holds for premium rates and their boundary values.

Log likelihood	2000	2001	2002
Variable	330625.1 (n = 5,181,149)	– 379935.3 (n = 5,470,778)	– 352624.8 (n = 5,462,871)
Constant	– 5.84 (0.093)	– 5.87 (0.080)	– 6.34 (0.077)
Industrial sector	– 0.28 (0.036)	– 0.31 (0.035)	– 0.25 (0.034)
Trade sector	– 0.42 (0.037)	– 0.42 (0.035)	– 0.34 (0.035)
Service industries	– 0.12 (0.039)	– 0.38 (0.038)	– 0.51 (0.038)
Transport	– 0.30 (0.039)	– 0.25 (0.038)	– 0.22 (0.038)
Catering	– 0.36 (0.044)	– 0.37 (0.043)	– 0.40 (0.043)
Social services/cultural	– 0.18 (0.038)	– 0.48 (0.037)	– 0.48 (0.037)
Semi-public	– 0.35 (0.038)	– 0.29 (0.036)	– 0.42 (0.036)
Financial sector	– 0.53 (0.038)	– 0.47 (0.037)	– 0.39 (0.037)
Temporary employment agencies	0.18 (0.038)	0.049 (0.038)	0.27 (0.038)
Public sector	– 0.37 (0.043)	– 0.31 (0.040)	– 0.53 (0.042)
Sector unknown	– 0.076 (0.058)	– 0.11 (0.055)	– 0.15 (0.055)
Annual salary			
10,000–19,999	0.37 (0.025)	0.23 (0.023)	0.031 (0.024)
20,000–29,999	0.40 (0.023)	0.39 (0.021)	0.21 (0.023)
30,000–39,999	0.46 (0.023)	0.38 (0.022)	0.11 (0.023)
40,000–49,999	0.47 (0.024)	0.38 (0.022)	0.035 (0.024)
50,000–59,999	0.47 (0.025)	0.30 (0.023)	0.0060 (0.024)
60,000–69,999	0.34 (0.028)	0.22 (0.026)	– 0.11 (0.028)
≥70,000	0.82 (0.032)	0.32 (0.030)	– 0.0094 (0.032)

**Table 1**

Grouped Logit estimates on cross-sectional data (standard errors in parentheses)

**Table 1**  
Grouped Logit  
estimates on  
cross-sectional  
data (standard  
errors in  
parentheses)  
*continued*

	2000	2001	2002
$15 < n \leq 25$	0.022 (0.027)	0.037 (0.028)	– 0.37 (0.027)
$25 < n \leq 50$	0.013 (0.025)	0.048 (0.027)	– 0.47 (0.025)
$50 < n \leq 100$	0.091 (0.025)	0.12 (0.027)	– 0.52 (0.024)
$100 < n \leq 250$	0.13 (0.025)	0.18 (0.026)	– 0.57 (0.024)
$250 < n \leq 1,000$	0.13 (0.025)	0.22 (0.026)	– 0.53 (0.023)
$n > 1,000$	0.071 (0.050)	0.25 (0.026)	– 0.47 (0.023)
% male, 25–35	0.95 (0.085)	0.98 (0.085)	1.13 (0.092)
% male, 35–45	1.40 (0.084)	1.79 (0.081)	1.93 (0.084)
% male, 45–55	1.17 (0.091)	1.89 (0.088)	2.02 (0.089)
% male, 55–65	0.23 (0.14)	0.67 (0.13)	1.68 (0.12)
% female, 15–25	0.20 (0.092)	0.26 (0.090)	0.56 (0.094)
% female, 25–35	1.53 (0.074)	1.65 (0.074)	1.77 (0.078)
% female, 35–45	1.21 (0.097)	1.56 (0.10)	1.98 (0.098)
% female, 45–55	2.10 (0.11)	2.07 (0.10)	1.52 (0.10)
% female, 55–65	0.31 (0.22)	1.22 (0.20)	1.81 (0.18)
Marginal incentive effect	0.096 (0.065)	– 0.081 (0.044)	– 0.20 (0.031)

it also may well be that the increase in anticipated effects can be explained instead by (initial) unanticipated incentives. This means that employers have gradually become more aware of the system of experience rating, thus increasing anticipated effects of experience rating over time.

### Unanticipated incentive effects

Within the context of the current analysis, unanticipated incentives are defined as the response to the imposition of premium increases that result from the experience-rating plan. In a way, estimating such effects can be considered as a test on information imperfections: if employers are fully aware of the incentive and their DI risks, premium rises would not result in higher preventive activities that improve the health and safety of workers.

In the aforementioned analysis, the effects of unanticipated premium rate increases are analysed, with the same data for the anticipated effects analysis.<sup>7</sup> Clearly, simply regressing the occurrence of a premium raise on the DI inflow rate yields an upward bias on our parameter of interest. Therefore, a so-called ‘difference-in-differences’ strategy is employed. This means that we compare changes in the DI inflow rate of employers who have experienced premium rises with changes in the DI inflow rate of employers who have not experienced premium rises (so far). As our data only cover three years (2000 to 2002), the attention is restricted to premium rises in 2001, caused by the DI inflow in 1999. More specifically, we concentrate on firms that paid the minimum premium in 2000, and experienced an increase in their individual premium rate in 2001, implying that they no longer pay the minimum premium. This group is confronted with increases in the premium rate that are usually far more substantial than any changes in the minimum premium; the group also receives a separate notice which specifies the disability costs that are passed through to them.

When following this difference-in-differences design, the increase in the DI inflow rate of employers who experienced a rise in their premium rate in 2001 is about 4 per cent lower than the reference group in 2001, and about 15 per cent lower in 2002 (with a coefficient of  $-0.16$  ( $0.021$ )\*). This suggests that the imposition of premium raises has an impact. Apparently, premium rate increases are unanticipated by employers – making them (more) aware of the experience-rating incentives, and triggering them to increase preventive activities. In addition, similar effects of experience rating are found for both the full and the partial DI scheme, at about 15 per cent after one year.

These results suggest that employers need a ‘wake-up call’ to pay attention to experience rating, and subsequently increase preventive activities. This is in line with a behavioural approach to occupational risks and uncertainty, particularly regarding the perception and valuation of risks. Regarding the perception of risks, there are three cognitive biases that cause actions to deviate from the standard economic model: the availability bias, the optimism bias and the accumulation bias.<sup>15†</sup> Within the context of the current paper, the availability bias – stating that humans tend to judge the likelihood of an event by its ease of recall – seems of

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\* This implies that, comparing 2000 and 2002, the DI inflow probability remained constant for this group.

† The optimism bias states that people tend to underestimate their injury risk compared to the average risk, whereas the accumulation bias states that people tend to perceive risks in isolation, rather than a sequence of similar events over a lifetime.

particular interest. It may be that employers are, to a certain extent, aware of the experience-rating system, but the risk of worker injuries and premium increases is underestimated as long as the event has not occurred. Thus, employers will first pay only little attention to prevention, as they judge this risk to be small. One way to explain this is by 'loss aversion' in the risk perception of employers: they dislike premium increases more than that they like premium decreases. In the experimental literature, there is strong evidence for this hypothesis. So far, however, it has not been applied in the context of job-related risks or experience-rating systems.<sup>15</sup>

## Discussion

The picture that emerges is that the impact of experience rating on DI inflow is substantial, with most evidence pointing to the presence of unanticipated incentives. Firms have increased their preventive activities once they have experienced (substantial) increases in their premium rates. Apparently, they were not well informed, either on the experience-rating system or on the nature and the size of their disability risk. It is likely that they responded by lowering the sickness rates in the first two years prior to the claims assessment, which in turn caused a lower number of DI claimants.

As to the presence of anticipated incentives, our estimation results are less compelling and confined to the most recent year in our sample only. This may be due to the empirical design that is used to track down such effects, with the most reliable (and significant) results in this particular year. In light of the evidence on unanticipated incentives, it may also be that the anticipated awareness of experience rating has gradually increased. This means that there has been a gradual transition from unanticipated to anticipated incentives.

Our results point to the effectiveness, as well as the limitations, of the current experience-rating scheme in the Netherlands. Recent work on Dutch survey data underlines the effectiveness of various measures that have been taken to increase employer incentives – with experience rating an important one.<sup>16</sup> In particular, this work stresses the importance of various accommodation and rehabilitation activities that employers and occupational health agencies employ, and of a timely start of such activities during the period of sickness. The results show that the series of reforms in sickness and disability schemes that were introduced from 2002 onwards have been quite successful.

Still, although the potential effects of experience rating were probably substantial, we also must conclude that the design of the experience-rating system is rather complex. For policy-makers, care should be taken of the delays in the system, as well as the complexity of the premium calculation. One may think of the provision of internet services and software options to calculate the financial consequences of DI costs. This may help to increase the speed at which employers become aware of the incentives of the experience-rating system, and behave more like the conventional, standard economic model suggests.

When taking a more up-to-date and broader perspective on our findings, a potential downside of the story may be that the reduction in DI inflow rates coincided with increased UI inflow rates. It may even be that the increased awareness has led employers to use the non-experienced-rated UI scheme as a substitute pathway to unemployment, just as the DI scheme was used in the past in reverse direction.<sup>5,6</sup> Still, the evidence so far suggests that this is not the case, as recent research finds the average participation rates of workers in the Netherlands increased, conditional on their health conditions.<sup>17</sup>

Related to this, in recent years the number of unemployed or temporary workers who apply for DI benefits has increased substantially. In 2009, almost half of the DI inflow consisted of temporary or unemployed workers, whereas they only constitute 15 per cent of the insured population.<sup>16</sup> It is likely that prevention and reintegration activities were less substantial for this group with DI costs that were exempted from experience rating, but it also may well be that more vulnerable worker groups are less able to obtain permanent positions.

## Acknowledgments

The author would like to thank UWV for providing access to data used in this paper.

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